

Testing the amount of emissions coming from exhaust stacks (a.k.a. Stack Testing) is one method by which the Wisconsin Department of Natural Resources (DNR) determines whether a business is meeting applicable air pollution requirements. If your business generates a large quantity of emissions, you may be required to test as often as once every two years. Others may have to perform one-time tests. In either case, specific requirements must be followed to perform stack testing properly and to ensure that DNR will accept the test results.

What are the Requirements?

DNR has the authority to require each business that generates air pollution to measure how much is released into the air. If simpler methods do not suffice, DNR may require the business to perform a stack test to accurately measure the amount of pollution coming out of each stack. This may be required as part of a construction or operation permit. Contact the Small Business Clean Air Assistance Program (SBCAAP) for fact sheets on the permit requirements.

Larger businesses that generate air pollution in excess of certain levels must perform tests every two years—this is specifically required in chapter NR 439 of the Wisconsin Administrative Code.

Will My Business Be Affected?

Your business may be required to do stack testing if it has been issued an air pollution control permit from the DNR. Also, if your facility's compliance with an applicable air pollution limit is in question, DNR may contact you and require testing to determine whether limits are met. Except for very large emission sources, most businesses are only required to do a one-time test.

What If I Have to Stack Test?

There are very detailed requirements in chapter NR 439, Wis. Adm. Code, regarding stack testing. Specific methods must be used for each pollutant. While some variations are approved for use, tests usually consist of three one-hour runs with the final emissions rate based on an average of the three runs.

These tests are **not** performed by DNR. You must hire a consulting firm that performs stack tests. Contact the SBCAAP for a list of stack test firms and a fact sheet with information about hiring consultants. This fact sheet suggests things to look for and questions to ask. Tests can cost thousands of dollars, so take care to hire someone reputable. If tests are improperly or incompletely done, you will have to pay to repeat the testing.

The key elements of a stack test are as follows:

Process Capacity

Any test must be performed at 100% of the capacity of the process for which the emissions are being tested. So, if you have an assembly line where solvent based adhesives are applied to parts, you must use the parts with the largest usage of adhesives during the test runs.

Notification

The business must notify DNR of the date the test will be performed a minimum of **20 business days** in advance. This is required to give DNR sufficient time to schedule a staff person to witness the test and approve the results.

Test Plan

When you notify DNR of the date, you should also provide the test plan. The stack test firm may prepare this for you, since much of the content relates to the work they will perform. If you have any concerns about the plan provided by a stack test firm, contact your

DNR inspector and ask to have it reviewed for completeness.

Your part of the test plan will entail devising a way to measure your throughput. During the test, be sure this is measured accurately from the same start and end times used while emissions from your stack are measured. If this is **not** done correctly, you may have to pay to have the tests repeated.

After the test is complete, you should have sufficient information to determine the amount of emissions based on a certain throughput of your product. That is called an **emission factor**.

Facilities

The business must also provide facilities needed to enable the stack test firm to safely perform the test method. This may include installing test ports on your stack or duct work and building a testing platform next to the stack or duct. Test equipment will require electricity, so you will have to ensure that an electric hook-up is available and power can reach the site.

If these things are not done, you may have to **reschedule** the test. At a minimum, you could incur an extra trip charge. The stack test firm you hire may transport staff and equipment considerable distances. Obtain a list of all provisions, equipment, and preparations required from the stack test firm. Preparedness will save money and time.

KEY CRITERIA FOR SITE PREPARATION

Many sources do not have stack testing ports (openings in the stack or ductwork to allow the test equipment to measure in the air stream) in the proper locations. EPA test methods require that the ports be located to minimize skewed results caused by turbulence in the air flow around disturbances. Disturbance can be caused by elbows or other changes in direction of the airflow, fans, or the actual exhaust point (see Figure 1).

To determine the proper test port location, you should do the following:

- measure the stack inside diameter
- measure the distance from a potential test port location to downstream and upstream disturbances
- measurement A in the diagram should be a distance at least equal to one-half stack diameter and ideally a distance of two stack diameters
- measurement B in the diagram should be a distance at least equal to two stack diameters and ideally a distance of eight stack diameters

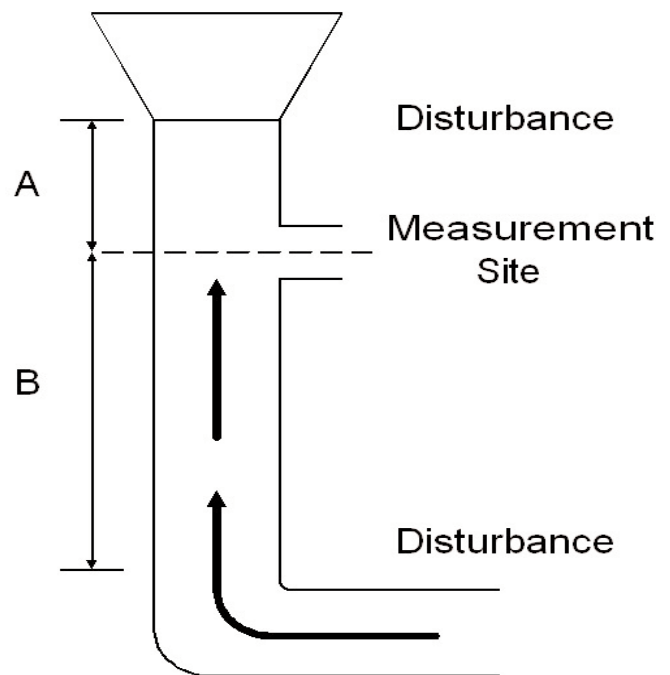


Figure 1. Stack test port location criteria.

- if you have a control device, you may have to provide test ports according to these measurements in ducts or the stack before and after the device
- for rectangular stacks, use the following equation to determine an equivalent stack diameter (D_c) for measuring the proper test port location:
$$D_c = 2L * W / (L + W)$$
where L is the length and W is the width of your stack

Take these stack design requirements into consideration as early as possible in your construction process. It is easiest to adjust the design when you first construct a stack, whether you actually install the test ports at that time or not. For example, make sure any distance between disturbances is at least 2.5 stack diameters so that test ports could be installed in the proper location. If your permit does not contain testing requirements, you may decide to delay the installation of test ports until DNR requires you to test.

If you have a control device to reduce emissions, you may be required to test the efficiency of the system that captures emissions from the process and conducts them to the control device. Often a permit will require that you meet a minimum efficiency for both capture of the emissions to the control and the reduction/destruction efficiency at the device. The emissions capture system is another design issue that you should address well in advance of a stack test. Specific design requirements may be spelled out

in your permit. If not, check with DNR, **before you construct**, to obtain the testing criteria for the capture efficiency of your system.

Test Report

Within **60 days** following completion of the test, submit **two copies** of a report summarizing the results and copies of all test results to DNR. Often the stack test firm will prepare this for you also, since analyses are completed and results compiled at their lab/office. Allow time to personally review the report before it is sent to the DNR.

Key Items Needed for Compliance

Tips to follow to be sure your stack test is in compliance:

- ✓ Maintain your processes in good operating condition. Operating efficiency not only saves you money but often results in lower emissions. Vacuum out your ductwork occasionally, especially before a test is performed, if you have very dusty processes. Excess dust may produce higher results than your true emissions.
- ✓ Hire a reputable stack test firm. You don't want to pay **twice!** You could include "DNR approval of test plan" as well as "DNR accepts the data" in the contract with the test firm to ensure that its work is acceptable to DNR.

- ✓ Submit all required notifications, plans, and reports in a timely manner. Missed deadlines can cause your test to be postponed, even up to the day of the test. If DNR does not have sufficient lead time, it can require you to postpone until 20 days from the date it received your notification.
- ✓ Test the air flows from your process to your stack. Be sure to balance what comes in with what goes out. Some companies have found ducts that were not going where they were supposed to, or flows that were higher coming in than going out through the stack. Air flow problems revealed during the testing process can result in costly postponement or re-testing.
- ✓ Be aware of the required sampling time periods for your test. Typical tests require **three** 1-hour runs. Some businesses must stockpile product or create an artificial scenario to operate for that period of time while meeting the 100% capacity criteria. If you cannot develop a scenario that allows you to operate your process for the prescribed amount of time, discuss alternatives with DNR or find another method for testing your emissions.

Making sure everything is arranged properly, well in advance of the actual stack test day, will help ensure acceptable test results.



Contacts for More Information or Assistance

The Small Business Clean Air Assistance Program helps smaller businesses understand and comply with the Clean Air Act regulations. Contact the program's Clean Air Specialists for more assistance: Renée Lesjak Bashel at 608-264-6153, Tom Coogan at 608-267-9214, or Jean Beckwith at 608-261-2517.



For further information on stack testing, contact the DNR's Central office at 608-267-0563 (stack test lead worker), or locate the appropriate contact at DNR by location or name at <http://dnr.wi.gov/org/aw/air/staff/AMstaffdir.pdf> or by topic at <http://dnr.wi.gov/org/aw/air/staff/AMsubjects.pdf>. You will need Adobe Reader to view these documents.